

## URBAN IRRIGATION WATER DEMANDS

In order to determine the amount of alternative water sources that will be necessary for future urban irrigation water, an evaluation of service area water demands was performed. This evaluation has revealed that significant increases in urban irrigation demands are projected through 2020. It was concluded that in some areas, historically used groundwater sources and reclaimed water might not be sufficient to support these demands. In addition, the seasonality of demands and potential supplies limits the use of some sources. There is 100 percent utilization of reclaimed water supplies in some portions of this project area during the dry months, while there is a surplus during the wet season. It was determined that sufficient sources of water do exist in the study area to offset a portion of the projected irrigation demands, mainly from surface water and reclaimed water expansions. It is clear that storage will be an integral component of this project to span the gap between the seasonal variability of wet weather surpluses and dry season deficits.

The urban irrigation water demands were developed using the modified Blaney-Criddle (B-C) model as provided by the District. The B-C methodology is explained in Attachment A. The demands were generated for the 1-in-10 year drought event, Table 5.

The B-C modeling analysis, included as Attachment B, used the following input variables to determine the urban irrigation water demands:

- Rainfall Station: Naples or Ft. Myers
- Irrigation System: Sprinkler
- Crop: Turf Grass
- Soil Type: Collier, 0.4 and Lee, 0.8 (based on Figures C-8 and C-4 from the Management of Water Use Permitting Information Manual, Vol. III)

**Table 5**  
**1-in-10 Year Drought Rainfall Values (inches)**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Collier	1.5	1.6	0.1	0.7	3.0	5.6	6.8	7.2	7.5	3.6	1.2	1
Lee	1.3	1.7	0.3	0.7	2.9	7.2	6.8	7.4	8	2.4	1.2	1.3
Average	1.4	1.65	0.2	0.7	2.95	6.4	6.8	7.3	7.75	3	1.2	1.15

Reclaimed water service areas were assumed to follow wastewater service areas. Figures 5 and 6 delineate the existing and projected future wastewater/reclaimed water service areas for the study area.

Monthly urban irrigation demands were projected based on irrigable acreage of each service area. There are two main components of the irrigable area including developed (residential and to a lesser extent, commercial) and open space areas (typically golf courses). Based on experience in Cape Coral and other reuse systems, a factor of 0.075 developed irrigable acres per capita was used for the regions. Open space irrigable areas were then added to the developed irrigable areas for each service area. As shown in Tables 6 and 7, this methodology resulted in total irrigable acreages of between 10 and 63 percent of the total acreages, depending on service area. These percentages are reasonable for the land use types encountered, namely, mixed-use areas, primarily residential with un-developable areas not requiring significant irrigation needs such as wetlands, surface water, and retail/commercial areas.

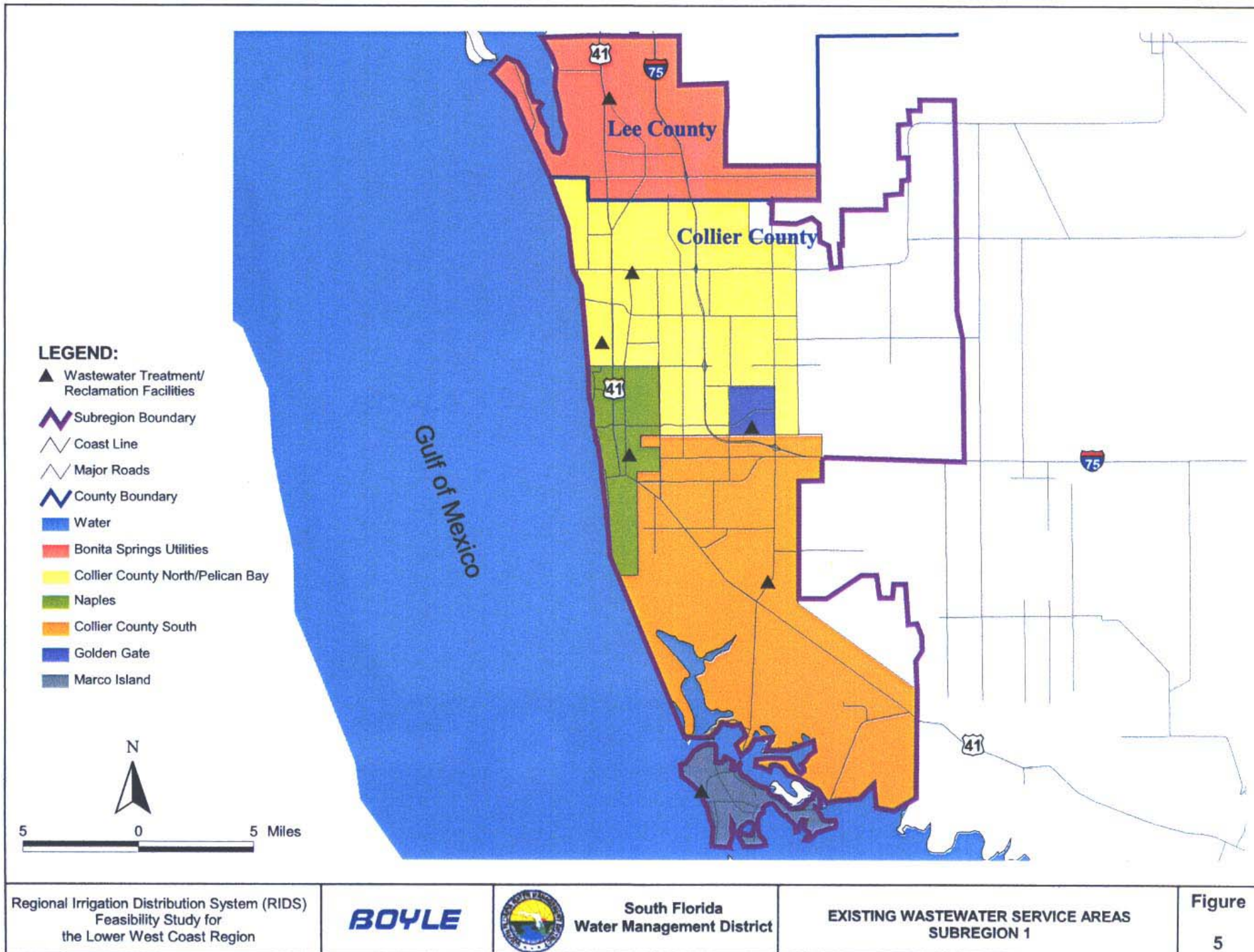
**Table 6**  
**Irrigable Acreage – Current**

<b>Facility Inventory</b>	<b>Total Acreage</b>	<b>Developed Irrigable Acreage</b>	<b>Open Space Irrigable Acreage</b>	<b>Total Irrigable Acreage</b>
Collier Co. North & Pelican Bay	54,374	4,627	3,170	7,797
Collier Co. South	78,290	4,862	4,198	9,060
Golden Gate	2,750	1,571	163	1,734
Marco Island Utilities	7,368	950	265	1,215
Naples	12,055	2,394	974	3,368
Bonita Springs	36,568	2,543	1,022	3,565
<b>Total</b>	<b>191,405</b>	<b>16,950</b>	<b>9,790</b>	<b>26,740</b>

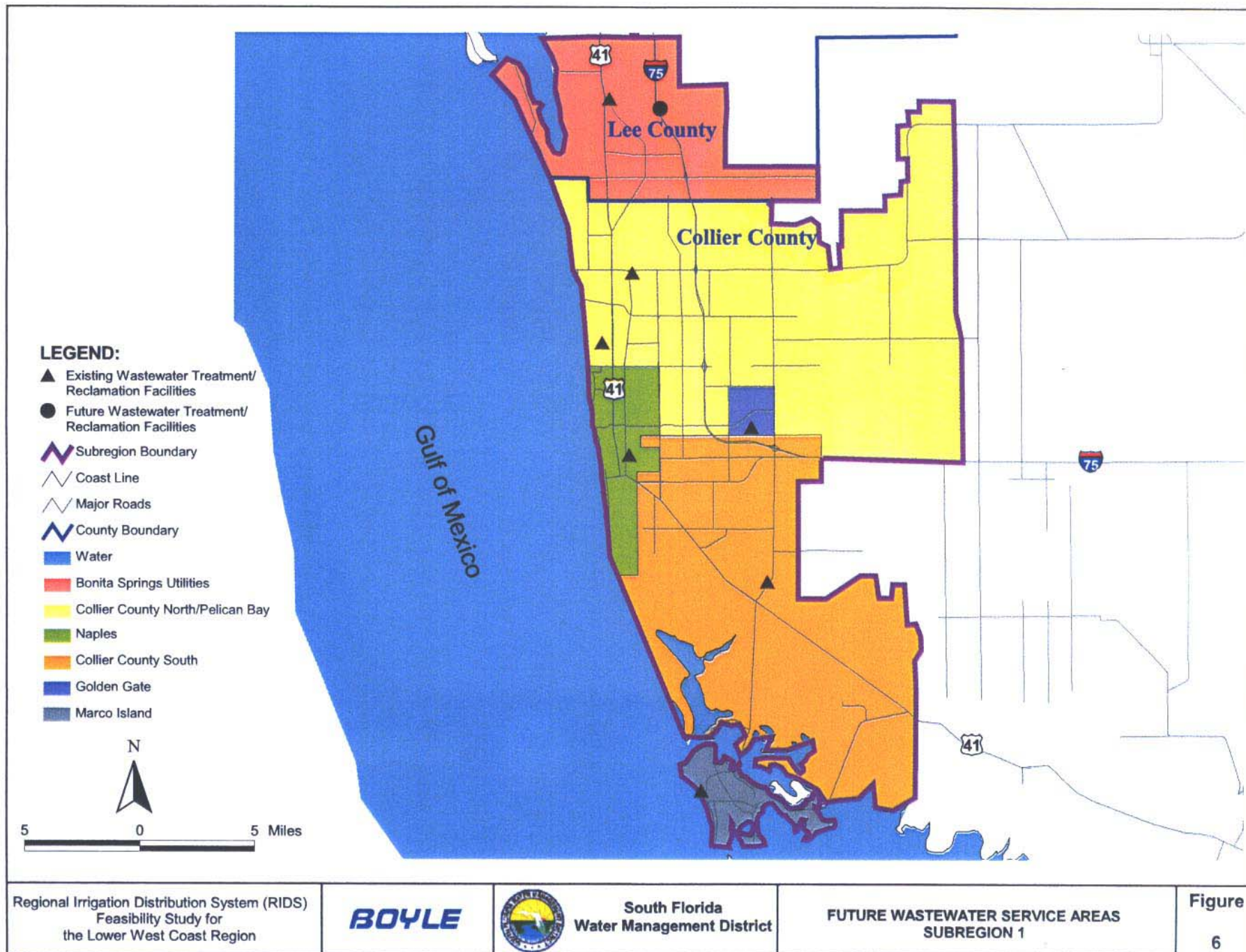
**Table 7**  
**Irrigable Acreage – Future**

<b>Facility Inventory</b>	<b>Total Acreage - Future</b>	<b>Developed Irrigable Acreage</b>	<b>Open Space Irrigable Acreage</b>	<b>Total Irrigable Acreage</b>
Collier Co. North & Pelican Bay	109,861	10,343	5,346	15,690
Collier Co. South	86,251	10,928	4,198	15,126
Golden Gate	2,750	1,571	163	1,734
Marco Island Utilities	7,368	1,410	361	1,772
Naples	12,055	2,770	974	3,744
Bonita Springs	36,568	4,786	1,022	5,808
<b>Total</b>	<b>254,850</b>	<b>31,808</b>	<b>12,064</b>	<b>43,872</b>

Urban irrigation water demands were estimated monthly for each service area, which required a modification to the B-C method. The B-C method does not realistically predict irrigation demands for the wet season (July through October) in Southwest Florida. With heavy local rainfall and an elevated water table, irrigation demands historically decrease during this time. For the wet season, reuse factors (ratio of monthly reuse demand to annual average reuse demand) were determined for each service area, with the exception of those not having a reuse flow; an average factor was then used. Therefore, the average demand as predicted by the B-C model was used for non-wet season months. The reuse factors were applied to these non-wet season demands to obtain the wet season demands. This methodology is described more thoroughly in Attachment A.







Tables 8 and 9 present these monthly demands for each service area. Figures 7 and 8 show the annual average demands spatially.

Current and future annual average irrigation demands for the Study Area are 86 and 132 MGD respectively. These numbers predict a 53% increase between 2000 and 2020. Considering areas such as Bonita Springs and much of Collier County are anticipating substantial growth, these estimates appear reasonable. However, the projected demands were more significant than expected. It is important to note that future water conservation efforts such as xeriscape landscaping, irrigation hours, and other mandatory ordinances were not taken into consideration for this analysis. Significant conservation efforts have been in effect for some time; therefore, demand projections are not expected to vary significantly.

**Table 8**  
**Urban Irrigation Demand Estimate - Current**

Facility	Monthly Irrigation Demand (MGD) <sup>1</sup>												Annual Average
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	(MGD)
<b>1-in-10 Drought Rainfall (in)</b>	1.4	1.7	0.2	0.7	3.0	6.4	6.8	7.3	7.8	3.0	1.2	1.2	3.4
Collier Co. North	9.5	12.4	27.7	35.8	37.5	35.3	21.8	23.4	26.2	20.7	20.3	13.5	23.7
Collier Co. South	11.9	15.5	34.6	44.7	46.9	44.1	26.1	19.7	11.4	25	25.3	16.8	26.8
Golden Gate	1.8	2.4	5.4	6.9	7.3	6.8	5	4.5	7.6	4.4	3.9	2.6	4.9
Marco Island Utilities	1.5	1.9	4.2	5.5	5.8	5.4	4	3.6	6	3.5	3.1	2.1	3.9
Naples	6.8	8.8	19.7	25.4	26.7	25.1	17.4	17.4	17.2	17	14.4	9.6	17.1
Bonita Springs	4	4.8	11.6	15.8	16.6	12.4	8.3	9.9	10.7	8.6	8.2	4.9	9.7
<b>Total Monthly Demand (MGD)</b>	<b>35.5</b>	<b>45.8</b>	<b>103.2</b>	<b>134.1</b>	<b>140.8</b>	<b>129.1</b>	<b>82.6</b>	<b>78.5</b>	<b>79.1</b>	<b>79.2</b>	<b>75.2</b>	<b>49.5</b>	<b>86.1</b>

<sup>1</sup> B-C results used for January through June and October through December. Factors of current reuse demand to annual average reuse demand were applied to the average of the B-C results for January through June and October through December.

**Table 9**  
**Urban Irrigation Demand Estimate – Future (Year 2020)**

Facility	Monthly Irrigation Demand (MGD) <sup>1</sup>												Annual Average (MGD)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	
<b>1-in-10 Drought Rainfall (in)</b>	1.4	1.7	0.2	0.7	3.0	6.4	6.8	7.3	7.8	3.0	1.2	1.2	3.4
Collier Co. North	18.1	23.6	52.5	67.8	71.2	67	41.2	44.4	49.8	39.3	38.4	25.6	44.9
Collier Co. South	16.9	21.9	48.9	63.1	66.3	62.4	37	27.9	16.2	35.3	35.8	23.8	38.0
Golden Gate	1.8	2.4	5.2	6.8	7.1	6.7	4.9	4.4	7.5	4.3	3.8	2.6	4.8
Marco Island Utilities	1.8	2.3	5.1	6.6	7	6.5	4.8	4.3	7.3	4.2	3.8	2.5	4.7
Naples	9.9	12.8	28.6	37	38.8	36.5	25.2	25.3	25	24.8	20.9	13.9	24.9
Bonita Springs	6.1	7.3	17.7	24.1	25.4	18.9	12.7	15.2	16.3	13.2	12.5	7.5	14.7
<b>Total Monthly Demand (MGD)</b>	<b>54.6</b>	<b>70.3</b>	<b>158</b>	<b>205.4</b>	<b>215.8</b>	<b>198</b>	<b>125.8</b>	<b>121.5</b>	<b>122.1</b>	<b>121.1</b>	<b>115.2</b>	<b>75.9</b>	<b>132.0</b>

<sup>1</sup> B-C results used for January through June and October through December. Factors of current reuse demand to annual average reuse demand were applied to the average of the B-C results for January through June and October through December.



